

Ecological Site Description—Rangeland

Shallow Clay (SwC), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central
R058AC059MT



1. Physiographic features: This ecological site can occur on nearly level to very steep uplands. It often occurs in complex with other ecological sites, particularly in rougher terrain. This site occurs on all slopes and exposures. Slight variations in plant community composition and production can result due to aspect. The amount of exposed rock outcrop tends to increase as slopes increase. Runoff and the potential for water erosion can be important features of this site.

Landform: sedimentary plain, hill, escarpment
Elevation (feet): 2250 - 4500
Slope (percent): 0–70
Depth to Water Table (inches): greater than 60
Flooding: none
Ponding: none
Runoff Class: medium to high
Aspect: all aspects, can be significant

2. Soils: These are clayey soils that are 10 to 20 inches deep to underlying beds of decomposed shale or nearly impervious clays. Few roots penetrate deeper than 20 inches. Available Water Holding Capacity to 20 inches is 2 to 4 inches.

3. Associated sites: Mainly Clayey, Clayey-Steep, and Shallow sites. Also Silty, Silty-Steep, Shale, Saline Upland, ClayPan, Dense Clay, and shale outcrop.

4. Similar sites: Clayey, Shallow, Clayey-Steep.

Clayey sites have similar textures, but differ mainly by being over 20 inches to rock, and having significantly more production. The plant community can be similar because of the restrictive layers of clayey textures.

The Shallow site differs by having a different texture, and generally being over sandstone or loamy beds.

The Clayey-Steep Site is over 20 inches deep to root restricting materials, as well as occurring on slopes over 15%.

5. Major Plant Community Types: The following are descriptions of several plant communities that may occupy this site:

Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs: The physical aspect of this site in the Historical Climax (HCPC) is that of a gentle to steep sloping grassland with scattered shrubs on steeper slopes. Approximately 70–75% of the annual production is from grasses and sedges, 5–10% from forbs, and 5–15% is from shrubs and half-shrubs. The canopy cover of shrubs is 1–5%.

Dominant species include **bluebunch wheatgrass**, **green needlegrass**, **plains muhly**, and **western or thickspike wheatgrass**. Short grasses such as **Sandberg bluegrass** and **prairie junegrass** are also present. There are abundant forbs (**purple and white prairie clover**, **prairie coneflower**, **dotted gayfeather**) which occur in smaller percentages. Shrubs such as **Nuttall's saltbush** and **winterfat** are common. **Rocky Mountain juniper** may also occur on steeper slopes.

The occurrence, frequency, timing, and intensity of fire all have an important affect on this community. The Wyoming big sagebrush is susceptible to fire and will tend to decrease with fire. The Nuttall's saltbush tends to be resistant to fire. Winterfat is very susceptible to burning, depending on the intensity. Some published reports indicate that spring burning may be least detrimental. Reports indicate further that fall burning has resulted in a 95 to 100 percent loss of winterfat in some situations.

This plant community is well adapted to the Northern Great Plains climatic conditions. The diversity in plant species and presence of tall, deep-rooted perennial grasses allows for drought tolerance. Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable moisture conditions. Abundant plant

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litter is available for soil building and moisture retention. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. This plant community provides for soil stability and a functioning hydrologic cycle.

Plant Community 2: Medium and Short Grasses/ Shrubs: This community occurs from shifts in climate or other disturbances, such as grazing that tend to increase **Wyoming big sagebrush**. Dominant grasses include **western or thickspike wheatgrass, Sandberg bluegrass, and prairie junegrass**. **Bluebunch wheatgrass, green needlegrass, and plains muhly** will still be present but in smaller amounts. Palatable and nutritious forbs will be replaced by less desirable and more aggressive species, such as **hairy goldenaster, silverleaf scurfpea, and scarlet globemallow**. Sweet clover is a common invader on this ecological site.

Grass biomass production and litter become reduced on Community 2 as the taller grasses become less prevalent, increasing evaporation and reducing moisture retention. Additional open space in the community can result in undesirable invader species. This plant community provides for moderate soil stability.

Plant Community 3: Shrubs and Half-shrubs/ Short Grasses: This is a disturbance induced community, with dominant species including **Wyoming big sagebrush, Sandberg bluegrass, prairie junegrass, blue grama, perennial forbs, and fringed sagewort**. Remnant amounts of western or thickspike wheatgrass and needleandthread may be present. Tall grasses and palatable forbs will be mostly absent.

Plant Community 3 is much less productive than Plant Communities 1 or 2, and has lost many of the attributes of a healthy rangeland. The loss of deep perennial root systems reduces total available moisture for plant growth. Reduction of plant litter will result in higher surface soil temperatures and increased evaporation losses. Annual species are often aggressive and competitive with seedlings of perennial plants. This community can respond positively to improved grazing management but it will take additional inputs to move it towards a community similar in production and composition to that of Plant Community 1 or 2.

Plant Community 4: Shrubs/ Half-shrubs/ Annual Grasses and Forbs/ Short Grasses: This community is the result of continual adverse disturbances. Dominant species include **Wyoming big sagebrush, fringed sagewort and broom snakeweed**, and annuals such as **cheatgrass, Japanese brome, and six-weeks fescue**. **Blue grama, Sandberg bluegrass, and prairie junegrass** may be present in lesser amounts.

Plant community 4 has extremely reduced production of native plants (< 400 lbs. /acre). The lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and increased evaporation, which gives short sod grasses and annual invaders a competitive advantage over the tall and medium grasses. This community has lost many of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy flow. Significant economic inputs and time would be required to move this plant community toward a higher successional stage and a more productive plant community.

5a. Cover and structure (Historic Climax Plant Community)

COVER TYPE	BASAL COVER (%)	CANOPY COVER (%)	AVERAGE HEIGHT (inches)
Cryptogams	T–5	T–5	0.25 - .50
Grasses/ sedges	5–12	40–60	18
Forbs	1–4	5–10	6
Shrubs	1–5	1–5	6
Litter	40–60		
Coarse fragments	5–10		
Bare ground	15–30		

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5b. Major Plant Species Composition - Historical Climax Plant Community

Common Name	Plant Symbol	Plant Group	Percent Comp.	Group Max. %	Mean Annual Precipitation (inches)			
					11	12	13	14
					(lbs./acre)	(lbs./acre)	(lbs./acre)	(lbs./acre)
Grasses and Sedges				70–90%	630-810	700-900	770-990	840-1080
Bluebunch wheatgrass	PSSP6	2	30-60		45-135	50-150	55-165	60-180
Western or Thickspike wheatgrass	PASME LLAL	14	5-15	15	45-135	50-150	55-165	60-180
Green needlegrass	NAV14	2	5-15		270-540	300-600	330-660	360-720
Needleandthread	HECOC8	10	0-5		0-45	0-50	0-55	0-60
Plains muhly *	MUCU3	3	0-5		-	0-50	0-55	0-60
Threadleaf sedge	CAFI	12	0–5}	10	0-90 No more than 45 for any one	0-100 No more than 50 for any one	0-110 No more than 55 for any one	0-120 No more than 60 for any one
Needleleaf sedge	CADU6	16	0-5}					
Blue grama	BOGR2	15	0–5}					
Prairie junegrass	KOMA	12	0–5}					
Sandberg bluegrass	POSE	12	0–5}					
Plains reedgrass	CAMO	16	0–5}					
Other native grasses	2GP		0–5}					
Forbs				1–5%	9-45	10-50	11-55	12-60
Purple prairieclover	DAPU5	21	1–5}	5	9-45 No more than 9 for any one	10-50 No more than 10 for any one	11-55 No more than 11 for any one	12-60 No more than 12 for any one
White prairieclover	DACA7	21	1–5}					
Prairie coneflower	RACO3	23	1–5}					
Dotted gayfeather	LIPU	21	1–5}					
Scurfpea spp.	PSAR	23	1–5}					
Hairy goldenaster	HEVI4	23	1–5}					
Scarlet globemallow	SPCO	20	1–5}					
American vetch	VIAM	18	1–5}					
Milkvetch spp.	ASTRA	24	1–5}					
Hood’s phlox	PHHO	28	1–5}					
Tufted milkvetch	ASSP6	24	1-5}					
Primrose spp.	OENOT	24	0-5}					
Buckwheat spp.	ERIOG	23	1-5}					
Western yarrow	ACMI2	19	0–5}					
Biscuitroot spp.	LOMAT	24	0–5}					
Miners candle	CRBR	24	0-5}					
Penstemon spp.	PENST	28	0–5}					
Pussytoes spp.	ANTEN	20	0–5}					
Prairie thermopsis	THRH	20	0–5}					
Other native forbs	2FP		0–5}					
Twogrooved poisonvetch **	ASBI2	24	0–T}	0–T	0–T	0–T	0–T	
White point loco **	OXSE	24						
Larkspur spp. **	DELPH	24						
Death camas **	ZIGAD	32						
Shrubs and Half-shrubs				5–15%	45-135	50-150	55-165	60-180
Wyoming big sagebrush	ARTRW8	37	1-5		9-45	10-50	11-55	12-60
Winterfat	KRLA2	35	1-5					
Nuttall’s saltbush	ATNU2	34	1-5					
Silver sagebrush	ARCA13	36	0-5}	10	0-90 No more than 45 for any one	0-100 No more than 50 for any one	0-110 No more than 55 for any one	0-120 No more than 60 for any one
Fringed sagewort	ARFR4	38	0–5}					
Prairie rose	ROAR3	38	0–5}					
Green rabbitbrush	CHVI8	36	0-5}					
Rubber rabbitbrush	ERNAN5	36	0–5}					
Other native shrubs	2SB		0–5}					
Broom snakeweed	GUSA2	37	0–T					
Plains pricklypear	OPPO	38	0–T					
Total Annual Production (lbs./ac):			100%		900	1000	1100	1200

*This species tends to occur mainly in the higher precipitation areas of the RRU.

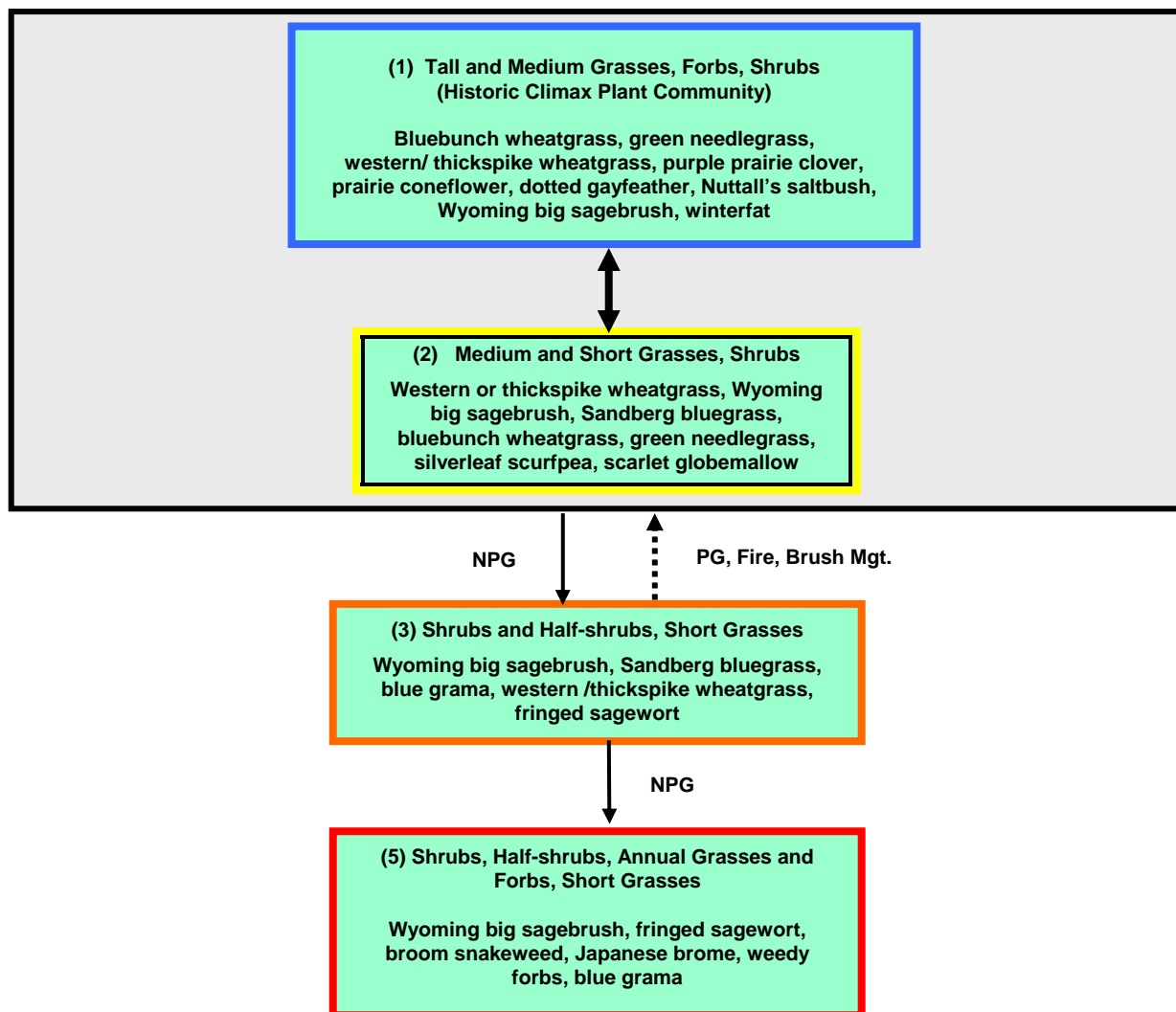
** These plants are poisonous to some grazing animals, during at least some portion of their life cycle.

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5c. Plant Communities and Transitional Pathways (diagram)



Smaller boxes within a larger box indicate that these communities will normally shift among themselves with slight variations in precipitation and other disturbances. Moving outside the larger box indicates the community has crossed a threshold (heavier line) and will require intensive treatment to return to Community 1 or 2. Dotted lines indicate a reduced probability for success. Yellow boxes indicate caution that the community may be in danger of crossing a threshold. Orange boxes represent communities that have crossed over thresholds from the HCPC and may be difficult to restore with grazing management alone. Red boxes represent communities that have severely shifted away from the HCPC and probably cannot be restored without mechanical inputs.

NOTE: Not all species present in the community are listed in this table. Species listed are representative of the plant functional groups that occur in the community.

PG = Prescribed Grazing: Use of a planned grazing strategy to balance animal forage demand with available forage resources. Timing, duration, and frequency of grazing are controlled and some type of grazing rotation is applied to allow for plant recovery following grazing.

NPG = Non-Prescribed Grazing: Grazing which has taken place that does not control the factors as listed above, or animal forage demand is higher than the available forage supply.

Fire: Prescribed fire or non-prescribed wildfire.

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6. Livestock Grazing Interpretations: Managed livestock grazing is suitable on this site as it has the potential to produce a moderate amount of high quality forage. Forage production is somewhat limited by steep slopes and shallow soils, and the potential for runoff, which reduces the effectiveness of the precipitation received for plant growth. The steeper slopes may also limit livestock travel and result in poor grazing distribution, especially in areas away from water. Management objectives should include maintenance or improvement of the plant community. Shorter grazing periods and adequate re-growth after grazing are recommended for plant maintenance and recovery. Heavy stocking and season long use of this site can be detrimental and will alter the plant community composition and production over time.

Whenever Plant Community 2 (medium and short grasses) occurs, grazing management strategies need to be implemented to avoid further deterioration. This community is still stable, productive, and healthy provided it receives proper management. This community will respond fairly quickly to improved grazing management, including increased growing season rest of key forage plants. Grazing management alone can usually move this community back towards the potential community.

Plant Communities 3 and 4 have substantially reduced forage production, and a high percentage of aggressive, non-palatable species. Once these plant communities become established, it will be much more difficult to restore the site to a community that resembles the potential with grazing management alone. Additional growing season rest and some type of brush management is often necessary for re-establishment of the desired species and to restore the stability and health of the site.

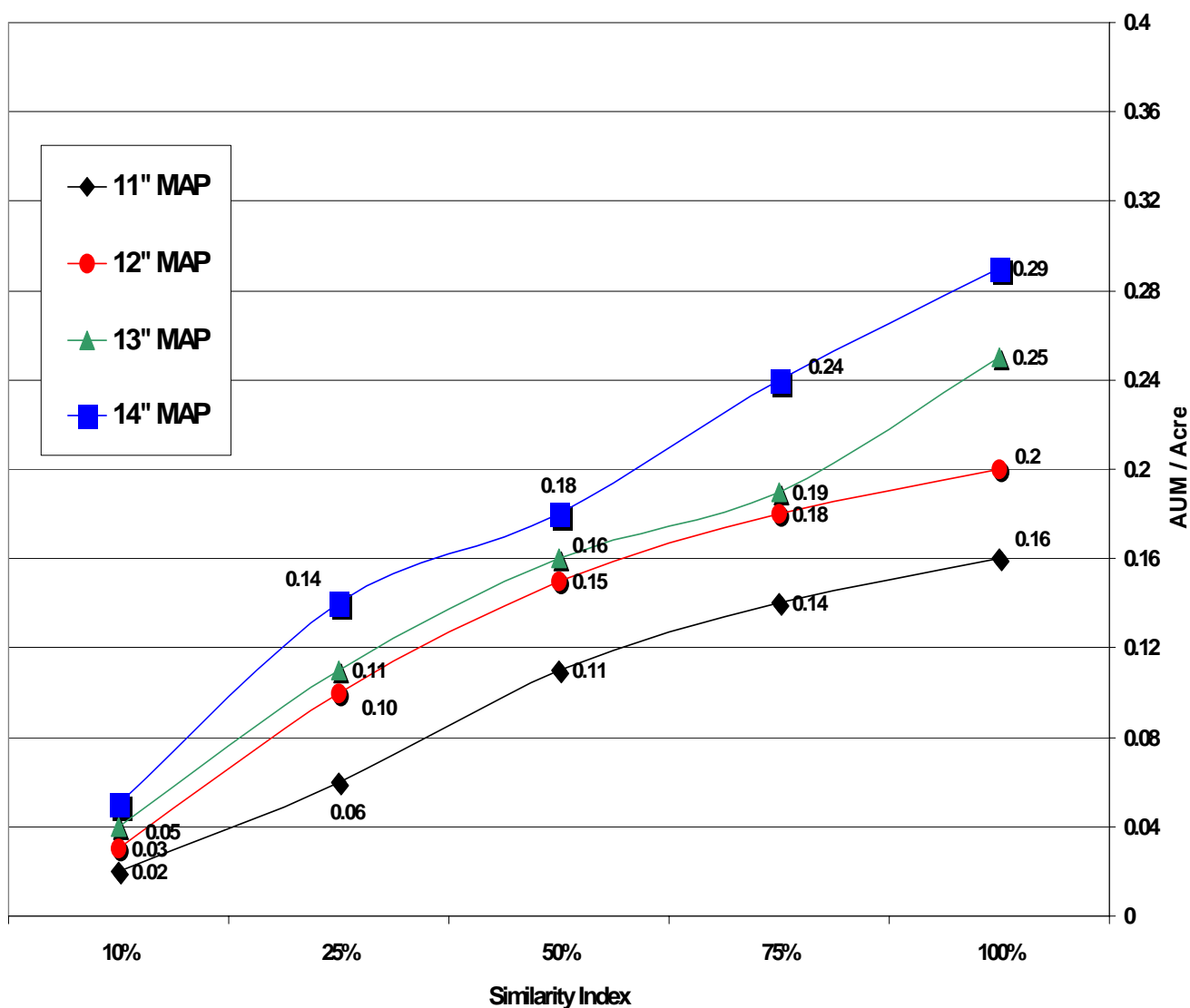
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6a. Guide to Safe Stocking Rates: The following charts provide guidance for determining an initial safe stocking rate. Animal Unit Month (AUM) figures are based on averages of forage production from data collected for this site over several years. The characteristic plant communities and production values listed may not accurately reflect the productivity of a specific piece of land. These tables should not be used without on-site information collected to determine the average forage productivity of the site. Adjustments to stocking rates for each range unit must be made based on topography, slope, distance to livestock water, and other factors which effect livestock grazing behavior.

Stocking Rate Guide (Cattle)
Shallow Clay 11 - 14", 58AC



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6b. Stocking Rate Guide:

Major Plant Community Dominant Plant Species	MAP	Total Production (pounds/ac)	Cattle			Sheep		
			Forage Production	AUM/ac	Ac/AUM	Forage Production	AUM/ac	Ac/AUM
1. Tall and Medium Grasses, Forbs, Shrubs (HCPC) <i>Bluebunch wheatgrass, green needlegrass, western wheatgrass, purple prairie clover, dotted gayfeather, Nuttall's saltbush, Wyoming big sagebrush, winterfat</i> (S.I. > 75%)	13–14"	1100-1200	925-1075+	.25-.29+	3.4-4.0+	875-1025+	.24-.28+	3.6-4.2+
	11–12"	900-1000	775-900+	.21-.25+	4.1-4.7+	725-850+	.20-.23	4.3-5.0+
2. Medium & Short Grasses, Shrubs <i>Western or thickspike wheatgrass, Wyoming big sagebrush, Sandberg bluegrass, bluebunch wheatgrass, green needlegrass, silverleaf scurfpea, scarlet globemallow</i> (S.I. 40–75%)	13–14"	605-1020	375-875	.10-.24	4.2-9.8	400-925	.11-.25	4.0-9.2
	11–12"	495-850	300-725	.08-.20	5.0-12.2	325-775	.09-.21	4.7-11.3
3. Shrubs & Half-shrubs, Short Grasses <i>Wyoming big sagebrush, Sandberg bluegrass, blue grama, western /thickspike wheatgrass, fringed sagewort</i> (S.I. 20–40%)	13–14"	440-840	225-500	.06-.14	7.3-16.3	250-600	.07-.16	6.1-14.6
	11–12"	360-700	175-425	.05-.12	8.6-20.9	200-500	.05-.14	7.3-18.3
4. Shrubs & Half-Shrubs, Annual Grasses & Forbs, Short Grasses <i>Wyoming big sagebrush, fringed sagewort, broom snakeweed, Japanese brome, weedy forbs, blue grama</i> (S.I. < 20%)	11–14"	180-480	50-175	.01 –.05	20.9-73.2	75-225	.02-.06	16.3-48.8

Stocking rates are calculated from average forage production values using a 25% Harvest Efficiency factor for preferred and desirable plants, and 10% Harvest Efficiency for less desirable species. AUM calculations are based on 915 pounds per animal unit month (AUM) for a 1,000-pound cow with calf up to 4 months. No adjustments have been made for site grazability factors, such as steep slopes, site inaccessibility, or distance to drinking water.

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7. Wildlife Interpretations: Complex topography and vegetative structure, along with the tendency to occur in a mosaic with other ecological sites make this site an important component of wildlife habitat diversity. Big game species are particularly attracted to this site, where it occurs in rough topography, because of thermal cover and winter range values. South slopes tend to stay open in winter where important browse species such as winterfat and Nuttall's saltbush are available. Rock outcrops and scattered Rocky Mountain junipers provide hunting perches for a variety of raptors. Golden eagles often hunt low to the ground along the steep sidehills characteristic of this site where they can surprise small mammals as they cruise over small drainages. Ferruginous hawks may nest on rock outcrops. Sites having steeper, rocky topography provide habitat for interesting songbird species such as rock wrens, canyon wrens and spotted towhees. Scattered junipers and pines host field sparrows and chipping sparrows. Springs and seeps may occur along toe slopes. These provide habitat for amphibians and many other wildlife species.

Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs (HCPC): The diversity of forbs, half-shrubs and shrubs provides feeding substrate for a variety of pollinating insects, which are prey for many birds, reptiles and small mammals. Springs and seeps provide habitat for amphibians such as tiger salamanders. The short-horned lizard is a representative reptile. The diversity of plant species and life forms, in combination with topographic variation, provides high quality bird habitat. Lark sparrows, chipping sparrows, rock wrens and ferruginous hawks are examples of birds using this community. Sharp-tailed grouse and sage grouse may use this community for lek sites on ridge tops and fairly level topography. The predominance of grasses plus a diversity of forbs, shrubs and half-shrubs in this community favors grazers and mixed feeders such as bison, pronghorn and elk. Winter range value is often high for mule deer and pronghorn when topographic diversity provides south exposures and browse plants such as Nuttall's saltbush and winterfat are available. Small mammal diversity may be fairly high. Example species include the kangaroo rat, deer mouse, olive-backed pocket mouse and desert cottontail.

Plant Community 2: Medium and Short Grasses/ Shrubs: Pollinator insect species diversity may decline with the loss of some succulent, palatable forbs. Livestock trampling and grazing around springs and seeps degrades amphibian habitat. A reduction in litter cover and residual plant material during early spring decreases nesting habitat value for sage grouse and other ground-nesting birds. The potential increase in big sagebrush cover may benefit sage grouse nesting and winter habitat to some extent. Pronghorn and mule deer still find winter browse but overall nutrition value declines with the reduction in winterfat and Nuttall's saltbush cover. Herbivorous small mammals, such as voles, may decline with the reduction in litter cover.

Plant Community 3: Shrubs and Half-shrubs/ Short Grasses: Insect species diversity further declines with the simplification of the plant community, although some species, such as grasshoppers, may be very abundant during population highs. The general drying of the site following loss of litter cover and residual vegetation continues to degrade amphibian habitat. Sparse vegetation and increased bare ground may provide suitable habitat for a few nesting bird species (i.e. horned larks) but the lack of complex vegetative structure and residual cover makes this community poor habitat in general for most ground-nesting birds and relatively poor big game habitat. Pronghorn and mule deer may forage in this type throughout the year. However, nutritional levels for big game are greatly reduced and are available for a much shorter period as compared to the HCPC.

Plant Community 4: Shrubs and Half-shrubs/ Annual Grasses and Forbs/ Short Grasses: Insects may be very abundant during population highs (i.e. grasshoppers) but diversity is low, especially of pollinators. Amphibian habitat is very degraded; ephemeral pools evaporate rapidly and the soil surface is very dry and hot during summer. Ground nesting bird habitat value is poor because of the lack of litter cover and residual plant cover in early spring. Sage grouse and Brewer's sparrows may be fairly abundant in the heavier sagebrush cover but probably suffer heavy losses while nesting on the poorly protected ground surface. Mountain plovers prefer to nest in this community type if a somewhat pebbly surface is present. Mule deer and pronghorn may utilize sagebrush and fringed sagewort during winter in this community.

8. Hydrology Data: The soils associated with this ecological site are generally in Hydrologic Soil Group D. The infiltration rates for these soils will normally be slow to very slow. The runoff potential for this site is moderate to high, depending on slope and ground cover/health. Runoff curve numbers generally range from 79 to 94.

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9. Site Documentation:

Authors: Original: NRCS, 1983 Revised: MJR, REL, RSN, POH, 2003

Supporting Data for Site Development:

NRCS–Production & Composition Record for Native Grazing Lands (Range-417): 3
BLM–Soil & Vegetation Inventory Method (SVIM) Data: 6
NRCS–Range Condition Record (ECS-2): 10
NRCS–Range/Soil Correlation Observations & Soil 232 notes: 10
Ecological Site Reference: NRCS 417 No.: Sweetgrass County 506 & 516, Musselshell County 516

Field Offices where this site occurs within the state:

Big Sandy	Columbus	Harlowton	Roundup
Big Timber	Crow Agency	Joliet	Stanford
Billings	Fort Belknap	Lewistown	White Sulphur Springs
Chinook	Hardin	Malta	Winnett

Site Approval: This site has been reviewed and approved for use:

Loretta J. Metz
State Rangeland Management Specialist

10/22/2004
Date

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Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 1
HCPC
Sweetgrass County
Bluebunch wheatgrass, Green
needlegrass



Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 1
HCPC
Musselshell County



Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 1
HCPC
Sweetgrass County

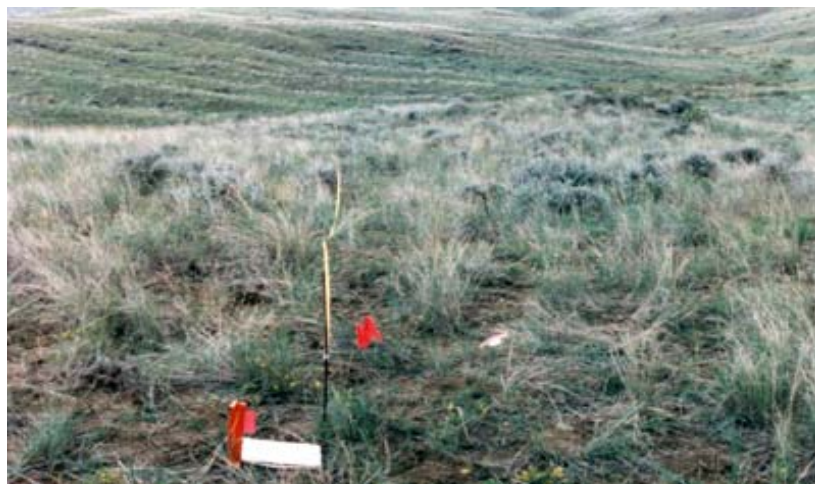
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Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 1
HCPC
Sweetgrass County



Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 1
Musselshell County
Bluebunch wheatgrass, Wyoming
big sagebrush



Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 1
HCPC

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Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 2
Musselshell County



Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 2
Musselshell County

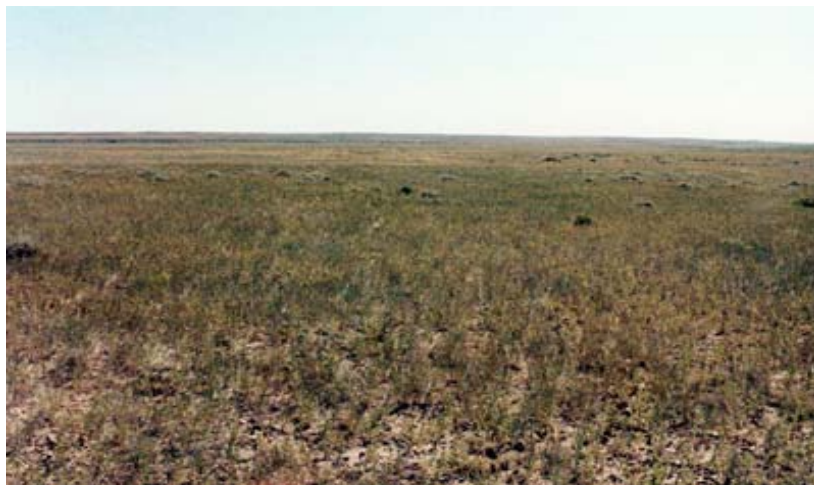


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Sedimentary Plains, Central
Plant Community 2
Golden Valley County
Western wheatgrass, Nuttall's
saltbush, Wyoming big sagebrush

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Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 3
Musselshell County



Shallow Clay, 11–14" MAP
Sedimentary Plains, Central
Plant Community 3